

Claims

1. A device comprising a fibre-reinforced part and including at least one system adapted for use in temperature compensation of strain measurements, said system comprising at least one optical fibre as well as connecting means adapted for connection of light emitting means and light receiving means to the optical fibre, said optical fibre comprising a number of reflecting structures, wherein
- 10 - the system comprises at least one holding means adapted to hold one or more loops formed on the optical fibre, in a way where at least one loop may substantially freely change length when subject to a change in temperature,
- 15 - and where the at least one optical fibre is at least extending between the connecting means and the holding means,
- 20 - and where said at least one loop, which may substantially freely change length, is held by the holding means and comprises a part of the optical fibre, which comprises a number of reflecting structures,
- 25 - and where said optical fibre, the connecting means and the holding means are at least partly embedded in said fibre-reinforced part of said device.
2. A device according to claim 1, where the system comprises one connecting means adapted for connection of light emitting means and one connecting means adapted for connection of light receiving means to the optical fibre, and where the optical fibre extends from one of the connection means to another via at least one holding means.
3. A device according to claim 1 or 2, where the system comprises two or more holding means, and where each holding means comprises at least one

loop comprising a part of the optical fibre, which comprises a number of reflecting structures.

4. A device according to one or more of claims 1-3, where the optical fibre
5 enters the holding means in one direction and exits in another direction.

5. A device according to one or more of claims 2-4, where two connecting means are integrated in a common housing.

10 6. A device according to one or more of claims 1-5, where the connecting means are placed by a surface of said part and adapted to be accessible from an internal position within said part.

15 7. A device according to one or more of claims 1-6, where the optical fibre at least between the connecting means and the holding means is provided with support means for reinforcement of the fibre.

8. A device according to claim 7, where the support means include a string comprising woven or braided fibres, preferably glass fibres.

20 9. A device according to claim 8, where the optical fibre is fastened to the string with double coated tape.

10. A device according to claim 8, where the optical fibre is integrated in the
25 string, preferably by weaving or sowing.

11. A device according to one or more of claims 1-10, where the connecting means and the holding means each comprise a recess, in which a part of the optical fibre is fastened with glue.

30 12. A device according to one or more of claims 1-11, where said part is a fibre-reinforced blade shell of a blade for a wind turbine.

13. A method for manufacturing a device comprising a fibre-reinforced part including a system adapted for use in temperature compensation of strain measurements, said system comprising at least one optical fibre as well as connecting means adapted for connection of light emitting means and light receiving means to the optical fibre, said optical fibre comprising a number of reflecting structures, where the system comprises at least one holding means adapted to hold one or more loops formed on the optical fibre, in a way where at least one loop may substantially freely change length when subject to a change in temperature, and where moulding means according to a predetermined shape of said device are provided as well as fibres for reinforcement and resin, where the method comprises independent steps of:

- connecting the optical fibre with the connecting means,
- 15 - forming at least one part of the optical fibre into one or more loops and holding said loops with the holding means, in a way where at least one loop is substantially free to change length when subject to a change in temperature, said at least one loop comprising a part of the optical fibre, which comprises a number of reflecting structures,
- 20 - applying the fibres for reinforcement, the optical fibre, the connecting means, the holding means and the resin on the moulding means and forming the device in a way where the optical fibre, the connecting means and the holding means are at least partly embedded in at least
- 25 the resin.

14. A method according to claim 13, where the optical fibre is connected with the connecting means, and where a part of the optical fibre is formed into one or more loops, and holding said one or more loops with the holding means in a way where at least one loop is substantially free to change length when subject to a change in temperature, said at least one loop comprising a part of the optical fibre, which comprises a number of reflecting structures, and where the optical fibre is wound onto at least one spool before the opti-

cal fibre, the connecting means and the holding means are applied on the moulding means.

15. A method according to claim 14, where the optical fibre is applied from
5 the spool and continuously fastened to the fibres for reinforcement while being unwinded.

16. A system adapted for a device or a method according to any of the preceding claims, said system being adapted for use in temperature compensation of strain measurements and comprising at least one optical fibre as well
10 as connecting means adapted for connection of light emitting means and light receiving means to the optical fibre, said optical fibre comprising a number of reflecting structures, wherein

- 15 - the system comprises at least one holding means adapted to hold one or more loops formed on the optical fibre, in a way where at least one loop may substantially freely change length when subject to a change in temperature,
- 20 - and where the at least one optical fibre is at least extending between the connecting means and the holding means,
- and where said at least one loop, which may substantially freely change length, is held by the holding means and comprises a part of
25 the optical fibre, which comprises a number of reflecting structures.

17. A system according to claim 16, where said system is assembled to form a ready-for-use kit, said kit comprising at least one spool onto which the optical fibre is winded.

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18. Connecting means adapted for a device, method or system according to any of the preceding claims, where the connecting means are adapted for connecting light emitting means and/or light receiving means to an optical

fibre, said connecting means comprising a housing adapted for storing and holding an end section of an optical fibre being formed with at least one loop placed by said end section.

5 19. Connecting means according to claim 18, where the connecting means comprise an elongate resilient portion, which portion is adapted to support an optical fibre when connected to the connecting means.

10 20. Connecting means according to claim 18 or 19, where the housing is provided with a shape, which is substantially frusto-conical or substantially like a truncated pyramid.

15 21. Holding means adapted for a device, method or system according to any of the preceding claims 1- 17, where the holding means comprise a housing provided with at least one recess, said recess having at least one substantially circular path adapted for substantially surrounding loops formed on an optical fibre.

20 22. Holding means according to claim 21, where the substantially circular section is connected with at least two recesses.

23. Holding means according to claim 21 or 22, where the housing is provided with a shape, which is substantially frusto-conical or substantially like a truncated pyramid.